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Publication date:
2009

Discussion paper

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July 2009

European Banking Center Discussion
Paper No. 2009–17

This is also a
CentER Discussion Paper No. 2009–58

ISSN 0924-7815

Accounting discretion of banks during a financial crisis

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July 13, 2009

Abstract: This paper presents evidence of banks using accounting discretion to overstate the value of distressed assets. In particular, we show that the stock market applies far greater discounts to a bank's real estate loans and mortgage-backed securities than are implicit in the book values of these assets, especially following the onset of the U.S. mortgage crisis. This suggests that bank balance sheets overvalue real estate related assets during economic slowdowns. Estimated discounts are smaller for distressed banks, as these banks derive relatively large benefits from the financial safety net to offset asset impairment. We also find that bank share prices, especially for banks with large exposures to mortgage-backed securities, react favorably to recent changes in accounting rules that relax fair value accounting. Banks with large exposures to mortgage-backed securities are also found to provision less for bad loans. Finally, we find that banks, and especially distressed banks, use discretion in the classification of mortgage-backed securities so as to inflate the book value of these securities. Our results provide several pieces of compelling evidence that banks' balance sheets offer a distorted view of the financial health of the banks, especially for banks with large exposures to real estate loans and mortgage-backed securities, and suggest that recent changes that relax fair value accounting may further distort this picture.

Key words: bank regulation, accounting standards, fair value accounting, real estate loans, mortgage-backed securities, financial crisis
JEL Classification: G14, G21

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1. Introduction

The ongoing U.S. mortgage crisis has sharply eroded the market value of U.S. banks. By the end of 2008, more than 60 percent of U.S. bank holding companies had a market-to-book value of assets of less than one, while this was the case for only 8 percent of banks at the end of 2001. At the same time, the average ratio of Tier 1 capital to bank assets has stayed constant at about 11 percent throughout this period. The market value of bank equity thus has dropped precipitously against a backdrop of virtually constant book capital. This raises doubts about the accuracy of the accounting values of bank assets and liabilities reported on bank balance sheets. As for non-financial firms, accurate accounting information on banks is, of course, crucial, as bank customers, supervisors, and capital markets all need correct information in their dealings with banks (for an overview of the literature on the cost and benefits of enhanced corporate disclosure and accounting transparency, see Leuz and Wysocki, 2008).[1]

This paper shows that banks systematically understate the impairment of their real estate related assets, especially following the onset of the U.S. mortgage crisis, in an effort to preserve book capital. Consistent with depressed bank share prices, we find that the stock market attaches significant discounts to banks' real estate exposure, in the form of real estate loans and mortgage-backed securities (MBS), relative to these assets' book values. Thus, the deterioration of these real estate assets implicit in bank stock prices is much larger than their impairment implicit in book values. Put differently, banks are

[1] For example, Karpoff et al. (2008) using firm-level information on legal enforcement actions show that financial misrepresentation has reputational consequences for firms and depresses firm valuation. There is also a large, related literature on the cost and benefits of earnings management of firms (e.g., Leuz et al., 2003, and Hutton et al., 2008).

shown to use the discretion offered by current accounting rules to value their real estate assets much more favorably than the market does as revealed by bank stock prices.

Distressed banks in particular appear to use their accounting discretion so as to maintain a relatively inflated book valuation of assets and bank capital. We specifically document two methods by which distressed banks maintain relatively high asset valuations. First, banks with large exposures to MBS are shown to report relatively small loan impairments in the form of loan loss provisions and loan charge-offs. Second, distressed banks tend to classify a relatively large fraction of their MBS as held-to-maturity – to be carried at amortized cost – rather than as available-for-sale – to be carried at generally lower fair value. All this raises serious doubts about the information content of banks' public accounts, especially during the current financial crisis.

To estimate implicit market discounts on key bank assets, we empirically relate Tobin's *q*, computed as the market-to-book value of assets, to these asset exposures. Thus, we relate Tobin's *q* to information on a bank's exposure to real estate loans and MBS. Our primary focus is on real estate related assets, as these assets constitute a large fraction of the total assets of the average bank, and as declines in U.S. real estate prices have raised doubts about the underlying value of these assets. In 2008, real estate related assets amounted to about 63 percent of the assets of the average bank, of which 53.6 percent were real estate loans and 9.6 percent were MBS. However, we also apply our methodology to other on- and off-balance sheet items, such as trading assets, deposits and other bank liabilities, the composition of bank capital, credit derivates in the form of credit protection bought and sold, and credit lines to securitization structures.

For our study, we use quarterly data for U.S. bank holding companies from the Reports on condition and income (also known as Call reports) from the final quarter of 2001 till the end of 2008, which completes a full business cycle as defined by the National Bureau of Economic Research (NBER). We find that the stock market started discounting banks' real estate loans in 2005, and that the average implicit discount on these loans amounted to 10 percent by 2008. The discount on real estate loans for low-valuation banks (with a value of *q* below the median) is estimated to be relatively small. This may reflect that low-valuation banks derive relatively large benefits from the financial safety net to offset loan impairment. As the average U.S. bank holding company in 2008 holds about 54 percent of its assets in the form of real estate loans, the implicit discount in loan values goes a long way toward explaining the current depressed state of bank share prices. We further find that investors first discounted banks' holdings of MBS in 2008. For that year, we find an average discount on these assets of 24 percent (relative to other securities), while the average MBS exposure amounted to 10 percent of assets.

The discount on MBS that are available-for-sale (and carried at fair value) implicit in share prices is estimated to be 23 percent, against a discount of 32 percent for MBS that are held-to-maturity (and carried at historical cost). Thus, even MBS that are carried at fair value appear to be overvalued on the books of the banks.

Pressures arose during the summer of 2008 to provide banks with more leniency to determine the fair value of illiquid assets such as thinly traded MBS to prevent these fair values from reflecting 'fire-sale' prices.[2] Correspondingly, on October 10, 2008 the Financial Accounting Standards Board (FSAB) clarified the allowable use of non-market

[2] Allen and Carletti (2008) and Plantin et al. (2008) offer theoretical models investigating potential contagion effects among banks if fair value accounting forces banks to value their securities according to observed 'fire-sale' prices.

information for determining the fair value of a financial instrument when the market for that instrument is not active. Subsequently, on April 9, 2009, the FSAB announced a related decision to provide banks greater discretion in the use of non-market rather than market information in determining the fair-value of hard-to-value assets. As expected, the stock market on both occasions cheered the banks' enhanced ability to maintain accounting solvency in an environment of low transaction prices for MBS. Using an event study methodology, we find that banks with large exposure to MBS experienced relatively large excess returns around both announcement dates, indicating that these banks in particular are expected to benefit from the expanded accounting discretion.

This paper provides two additional pieces of evidence that banks with large real-estate related exposures use accounting discretion so as to maintain high book values and accounting solvency. First, banks have considerable discretion in the timing of their loan loss provisioning for bad loans and in the realization of loan losses in the form of charge-offs. Thus, banks that are pressured by large exposures to MBS and related losses can attempt to compensate by reducing the provisioning for bad debt. Indeed, we find that banks with large portfolios of MBS report relatively low rates of loan loss provisioning and loan charge-offs.

Second, we examine banks' choices regarding the classification of MBS as either held-to-maturity or available-for-sale. We consider this categorization separately for MBS that are covered or issued by a government agency. In 2008, the fair value of especially non-guaranteed MBS tended to be less than their amortized cost. This implies that banks could augment the book value of assets by reclassifying MBS available-for-sale as held-to-maturity. Indeed, we show that the share of non-guaranteed MBS that are

held-to-maturity increased substantially in 2008. Reclassification of this kind is also advantageous for banks whose share price is depressed on account of large real estate related exposures. Consistent with this, we find that the share of MBS kept as held-to-maturity is significantly related to both real estate loan and MBS exposures. Moreover, these relationships are stronger for low-valuation banks.

Taken together, our evidence on banks' provisioning practices and MBS classification suggest that banks with large real-estate related exposures use the discretion offered by accounting rules so as to inflate the book value of assets and of bank capital.

A bank's public accounts ideally provide accurate information on the bank's health to bring about appropriate economic actions on the part of investors, the banks themselves, as well as bank regulators. The evidence of this paper importantly informs the debate about the appropriateness of current accounting rules (see Laux and Leuz (2009) for a survey).[3]

A first requirement of accounting information is that it provides accurate valuations of the items on a bank's balance sheet. A literature reviewed by Barth et al. (2001) and Holthausen and Watts (2001) asks whether accounting information is value relevant in the sense that it conforms to the information that bank shareholders use to price bank shares. Barth et al. (1996) and Eccher et al. (1996) find that fair value estimates of loan portfolios and securities help to explain bank share prices beyond amortized costs. This paper in turn finds steeper discounts implicit in share prices for MBS that are carried at amortized cost than for those that are carried at fair value, to suggest that fair values more closely reflect valuation implicit in share prices.

[3] Freixas and Tsomocos (2004) argue that historical cost accounting is to be preferred over fair value accounting in one important dimension, namely that it allows for better intertemporal smoothing of bank dividends.

Our finding that distressed banks tend to employ discretion in their loan loss provisioning, loan charge-offs, and classification of MBS to boost their accounting value should be reason for concern, as it implies that the discretion implicit in current accounting rules lead to systematic biases in valuations on bank balance sheets.

Our paper is related to an emerging literature on the causes and effects of the U.S. real estate and banking crisis. Recent work shows that house price appreciation (e.g., Demyanyk and Van Hemert, 2008) and asset securitization (e.g., Keys et al., 2008; Mian and Sufi, 2008, Loutskina and Strahan, 2009), combined with a more general deterioration of lending standards by banks (e.g., Dell'Ariccia et al., 2008), helped fuel a crisis in U.S. mortgage markets, with bank capital being eroded as the asset price bubble in real estate markets burst starting in 2007.

In the remainder of paper, section 2 sets out the relationship between Tobin's *q* and market discounts on bank assets. Section 3 discusses the data. Section 4 first presents empirical evidence on market discounts of real estate related assets relative to book values. Subsequently, it provides evidence on the stock market response to the announcements of more lenient rules for accounting for illiquid assets. Section 5 examines the use of bank discretion regarding loan loss provisioning, loan charge-offs, and the classification of MBS into different accounting categories. Section 6 concludes.

2. Tobin's *q* value and market discounts

In this section, we describe how observations of Tobin's *q* can be used to infer discounts on bank assets implicit in the stock market.[4] Let *MV* be the market value of the

[4] In similar fashion, Sachs and Huizinga (1987) estimate discounts on third world debt on the books of U.S. commercial banks at the time of the international debt crisis of the 1980s. A related literature, starting

bank. At the same time, let A_i be the accounting value of asset *i* and let L_i be the accounting value of liability *i*. Assuming there are operating markets for a bank's assets and liabilities, we can state a bank's market value as follows:

$$MV = \sum_i v_i^a A_i - \sum_i v_i^l L_i \qquad (1)$$

where v_i^a is the market value of asset *i* and v_i^l is the market value of liability *i*.[5]

We can define *q* as the market value of the equity of the bank plus the book value of all liabilities divided by the book value of all assets as follows:

$$q = \frac{MV + \sum_i L_i}{\sum_i A_i}$$

Substituting for *MV* from (1) into the expression for *q*, we get:

$$q = 1 - \sum_i d_i^a a_i + \sum_i d_i^l l_i \qquad (2)$$

where $d_i^a = 1 - v_i^a$, $d_i^l = 1 - v_i^l$, $a_i = \frac{A_i}{\sum_i A_i}$ and $l_i = \frac{L_i}{\sum_i A_i}$. Note that d_i^a and d_i^l are the discounts implicit in the bank's stock price of a bank's assets and liabilities relative to book values. At the same time, a_i and l_i are the accounting values of particular assets and liabilities relative to the book value of all assets.

From eq. (2), we see that if all assets and liabilities of the bank are valued at market value in the bank's balance sheet, then *q* equals 1. Alternatively, a deviation of *q*

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with Lang and Stulz (1994) and including Laeven and Levine (2007), has studied discounts in Tobin's *q* arising from corporate diversification. In that literature, discounts are computed for each business unit of a conglomerate with respect to the value of comparable stand-alone firms, while here we compute discounts for different assets and liabilities of the same bank.

[5] In eq. (1), we ignore that market value may depend on the co-existence of certain assets and liabilities as discussed in, for instance, DeYoung and Yom (2008).

from 1 implies that the market valuation of at least one balance sheet items differs from its accounting value.[6]

3. The data

In this study, we consider U.S. bank holding companies that are stock exchange listed. These companies report a range of accounting data to the Federal Reserve System by way of the Report on condition and income (Call report). We are using quarterly data from these Call reports from the final quarter of 2001 till the end of 2008. This covers a full business cycle as defined by the NBER from the previous recession which ended in November 2001 until the current ongoing recession which started in December 2007. Our focus is on the year 2008, one year into the recession and what is generally considered the start of the U.S. mortgage default crisis (see for example Dell'Ariccia et al. (2008) and Mian and Sufi (2008)), when delinquencies on mortgage loans increased sharply.

Using stock market data from Datastream, we use the market value of common equity plus the book value of preferred equity and liabilities as a proxy for the market value of a bank's assets. Tobin's *q* is then constructed as the ratio of this proxy for the market value of bank assets and the book value of assets. Figure 1 reports the average Tobin's *q* per quarter over our sample period. The mean value of *q* has declined from 1.083 in the final quarter of 2001 to 1.004 in the final quarter of 2008. This suggests that over this period, the market value of bank assets has declined more than its book value.

[6] Current book values of, say, real estate loans could already reflect some loan loss provisioning. Estimated discounts on bank assets then reflect the difference between market perception of asset impairment and the recognition of this impairment through reported loan loss provisioning (rather than the difference between market value and origination value). Put differently, the estimated discount reflects the difference between market perception of any asset impairment and the accounting treatment of this impairment.

We define a zombie bank as a bank with a q of less than one.[7] The decline of the average q has been accompanied by an increase of the share of banks that are zombie banks. As presented in Figure 1, the share of zombie banks has increased from 0.082 at the end of 2001 to 0.604 at the end of 2008. During this period, the share of zombie banks has tended to be smaller than in 2001 and 2008 reflecting an upswing of the business cycle. In fact, the share of zombie banks reached a low of 0.006 during the second and third quarters of 2005.

U.S. banks are exposed to the real estate market in two important ways. First, they have significant portfolios of real estate loans. As an index of this exposure, we construct the ratio of real estate loans to overall assets. From 2001 to 2008 this share of real estate loans has increased substantially from 0.427 to 0.497 for the average bank holding company as reflected in Figure 2. Thus, about half of the average bank's assets consist of real estate loans by 2008. In addition, banks are exposed to the real estate market through their holdings of MBS. The average ratio of the book value of MBS to the book value of all assets has declined slightly from 0.127 in 2001 to 0.123 at the end of 2008.

The book value of MBS reflects different accounting conventions depending on whether these securities are held-to-maturity or available-for-sale. MBS classified as held-to-maturity are carried at amortized cost. This amortized cost may be adjusted periodically for capitalized interest and may also reflect previous loan loss provisioning. However, these adjustments to amortized cost are likely to be relatively small so that amortized cost is relatively close to origination values.

[7] The term zombie bank has frequently been used in the context of Japan during the 1990's banking crisis when Japanese banks continued to lend to unprofitable borrowers (e.g., Caballero et al., 2008).

Alternatively, MBS can be available-for-sale. In this case, these securities are to be carried at fair value. Fair value is meant to reflect observed market values (of either the underlying asset – level 1 assets – or a comparable asset – level 2 assets) or otherwise reflect the outcome of a bank's own valuation models (level 3 assets). Again, banks' assessments of fair value may differ across banking institutions as the determination of fair value in practice leaves banks with significant discretion. At any rate, at a time of declining asset values, one expects fair values to be less than amortized cost.

Interestingly, banks report in their Call report filings both the amortized cost and fair value of MBS regardless of whether these are held-to-maturity or available-for-sale. Thus, for MBS that are carried at amortized cost we also know the assessed fair value, while for MBS carried at fair value we also know the reported amortized cost. This enables us to compute a bank's share of MBS that are held-to-maturity (rather than available-for-sale) on a single accounting basis. Specifically, we can compute the share of MBS that is held-to-maturity using amortized costs for all MBS.

The share of MBS that is held-to-maturity is computed separately for MBS that do and do not benefit from some explicit or implicit official guarantee. Guaranteed MBS are those that are guaranteed or issued by U.S. government agencies such as the Federal National Mortgage Association (FNMA), the Federal Home Loan Mortgage Corporation (FHLMC), and the Government National Mortgage Association (GNMA), more generally known as Fannie Mae, Freddie Mac, and Ginnie Mae, respectively.[8] Figure 3 shows that for most of the sample period the share of non-guaranteed MBS classified as held-to-maturity exceeded the analogous share of guaranteed securities. Moreover, during

[8] Note that these guarantees tend to cover underlying repayment of interest and principle, but not valuation risk stemming from interest rate changes or mortgage prepayment.

2008 the share of non-guaranteed MBS labeled held-to-maturity rose strongly from 0.082 to 0.117. During that year, the share of guaranteed MBS that is held-to-maturity, instead, fell from 0.084 to 0.068.

Shifts of MBS into the held-to-maturity category increase the book value of assets, if fair value is less than amortized cost. Figure 4 reports the mean ratio of fair value to amortized cost as reported by different banks over the sample period separately for guaranteed and non-guaranteed MBS (regardless of whether these securities are classified as held-to-maturity or available-for-sale). We see that this ratio is fairly close to one for guaranteed MBS throughout the sample period. Non-guaranteed MBS, however, had fair values that on average significantly exceeded amortized cost in 2001 (with a ratio of 1.133), even if fair values were much less than amortized cost at the end of 2008 (with a mean ratio of fair value to amortized cost of 0.871). The shifting of non-guaranteed MBS into the held-to-maturity category during 2008 apparent in Figure 3 thus has tended to boost the overall book value of MBS for banks.

Figure 5 shows the development of the Tier 1 capital ratio and the share of Tier 1 capital in total bank capital. Tier 1 capital represents the core component of capital for banks and is regarded as the key measure of a bank's financial strength from a regulator's point of view. Tier 1 capital consists primarily of common stock, retained earnings, and disclosed reserves. Interestingly, we find that the ratio of Tier 1 capital to total risk-weighted assets has remained fairly stable over the sample period.[9] The data shows that

[9] This result appears to contradict recent work by Adrian and Shin (2008) who report that leverage has increased dramatically in recent years for U.S. brokers and dealers. This difference can in part be explained by the difference in sample (brokerage firms versus commercial banks) but also because they express leverage in terms of total assets unadjusted for risk. Given that the risk of real estate related assets has been mispriced, risk weights applied to such assets have understated the true risk content of banks' assets. If risk weights that more accurately reflect the underlying risk of assets would have been used, financial leverage as measured here, which is the leverage measure used by regulators, would have increased.

while leverage increased for some banks, the average ratio of Tier 1 capital to total assets decreased only modestly from 12.2 percent in 2001 to 11.1 percent in 2008. The composition of capital also altered only modestly over the sample period, with the share of Tier 1 capital in total capital shrinking from 88.2 percent in 2001 to 86.3 percent in 2008. This suggests that, although some banks have looked for less traditional, non-core sources of capital, such as subordinated debt or perpetual stock, to boost capital and increase assets, most banks continued to do so while also increasing Tier 1 capital.

A bank's *q* should be close to one in a world where all bank assets and liabilities are readily tradable and marked to market. At the same time, deviations of *q* from one can be explained by discrepancies between market values and book values of any bank balance sheet items. Below, we relate a bank's *q* to a range of bank balance sheet items to explain bank-level variation in *q*. Variable market values of bank balance sheet items in an environment of slowly adjusting book values suggest that the dependence of *q* on bank balance sheet items varies over time. It is especially interesting to assess whether the valuation of bank balance sheet items implicit in bank stock prices differs from book values at a time of financial crisis. Therefore, the emphasis of the empirical work will be on the year 2008, the year following the onset of the U.S. mortgage default crisis.

Summary statistics for the main variables in 2008 are provided in Table 1. We exclude banks with Tobin's *q* exceeding its 99th percentile (amounting to a Tobin's *q* greater than 1.5) as these are not ordinary banks that carry primarily financial assets. The mean ratio of loans to assets is 0.714, while the mean ratio of real estate loans to assets is 0.536. The ratio of securities to assets (using amortized cost to value held-to-maturity securities and fair values for securities available-for-sale) is 0.169. As a subcategory, the

average ratio of MBS to assets is 0.096. This can be split into MBS held-to-maturity at 0.8 percent of assets, and MBS available-for-sale at 8.8 percent of assets. MBS that are held-to-maturity can again be split into guaranteed and non-guaranteed securities equivalent to 0.7 and 0.1 percent of assets, respectively. Guaranteed and non-guaranteed MBS that are available-for-sale in turn amount to 8.0 and 0.8 percent of assets.

Next, Big is a dummy variable that equals one, if a bank's total assets exceed the sample average total assets in a given quarter. HPI is a state-level house price index from the U.S. Office of Federal Housing Enterprise Oversight (OFHEO). Low valuation is a dummy variable that equals one in a given quarter if a bank's *q* is less than one, and zero otherwise. By the end of 2008, 46 percent of U.S. banks had a value of *q* of less than one.

Several additional asset categories are considered as well. Trading is defined as trading assets relative to total assets (obtained from Schedule HC-B of the Call report). Trading assets, which include some MBS, are carried at fair value and held in the bank's trading book.[10] A detailed split-up of trading assets is only available for the domestic offices of bank holding companies and is not reported. On average, trading assets only amount to a share of 0.005 of assets, because only large banks tend to have such assets.

Among bank liability variables, Deposits is defined as total deposits divided by total assets, and it amounts to 72.0 percent of assets on average. These deposits include relatively stable retail deposits and more unstable wholesale deposits. Data on deposits are obtained from Schedule HC-E of the Call report files. As an index of unstable wholesale deposits, we construct the ratio of deposits that exceed $ 100,000 and have a remaining maturity of less than one year to total assets. These large and short-term

[10] Trading assets are to be reported only by bank holding companies with average trading assets of $2 million or more in any of the four preceding quarters.

deposits on average are 2.5 percent of assets. Banks are further seen to issue relatively little commercial paper, with commercial paper amounting to only 0.l percent of assets on average. Bank capital, being the sum of Tier 1 and Tier 2 capital, is composed mostly of Tier 1 capital, amounting to 86.3 percent of capital on average.

Off-balance sheet items can equally matter for bank valuation. However, we find that they tend to constitute a small fraction of total assets for the average bank, in part because only large banks tend to have significant off-balance exposure. Data on off-balance sheet items are obtained from Schedule HC-L of the Call report files. Credit derivatives positive and Credit derivatives negative are the mean ratios of credit protection purchased and credit protection sold to total assets, respectively. These ratios are equivalent to 1.5 and 1.4 percent of assets.

We also obtain information on banks' securitization and asset sale activities from Schedule HC-S of the Call report files. The variable Securitized is the ratio of assets sold and securitized with servicing retained by the bank, or with recourse or other seller provided credit enhancements, to total assets. Securitized takes on a value of 1.5 percent of assets on average. Next, Recourse is the maximum amount of credit exposure arising from recourse or other seller-provided credit enhancements provided to securitization structures relative to total assets. Recourse is relatively small at 0.05 percent of assets on average. Sponsored is the maximum amount of credit exposure arising from credit enhancements provided to other institutions' securitization structures relative to assets. This kind of exposure is even smaller at 0.01 percent of assets on average. Finally, Sales stands for the ratio of assets sold with recourse or other seller-provided credit enhancements and not securitized to total assets, with a mean value of 0.032. The mean

values of these off-balance sheet items are seen to be small on average and they are expected to affect bank valuation correspondingly little.

In principle, investors could respond mainly to the fact that a bank has a particular kind of off-balance sheet exposure rather than to the size of this exposure. To allow for this, we also construct several dummy variables corresponding to our five off-balance sheet variables that denote whether or not the bank has exposure to a particular off-balance sheet item. Thus, Credit derivative, positive is a dummy variable that equals one if the Credit derivative, positive variable is positive, and zero if Credit derivative, positive is zero. In the table, we see that 5.8 percent of banks have, in fact, either bought or sold any credit protection. Relatively many banks, in fact 28.8 percent of banks in the sample, have a positive Sales dummy variable, indicating that they sold some non-securitized assets with recourse or seller-provided credit enhancements.

Next, loan loss provisioning is calculated as loan loss provisions divided by the book value of all loans. The mean loan loss provisioning rate is 0.0077. Net charge-offs, in turn, is the ratio of the difference between loan charge-offs and loan recoveries to the book value of loans. The mean net loan charge-off rate is 0.0050. Thus, loan loss provisioning exceeded net loan charge-offs in 2008, as expectations of additional loan losses surpassed actual loan write-offs. Finally, the share of real estate loans is the ratio of real estate loans to total loans with a mean value of 0.7429.

4. Market discounts and valuation effects of real estate related assets

This section first provides empirical estimates of market discounts of real estate related assets relative to book values. Subsequently, it examines bank stock price

reactions to amendments of fair value accounting rules. Finally, it investigates the use of banks' discretion regarding the accounting for bad loans in the form of loan loss provisioning and loan charge-offs.

4.1 Empirical evidence on market discounts

This subsection reports the results of regressions of *q* to reveal implicit stock market valuations of key balance sheet and off-balance sheet items. All regressions include U.S. state fixed effects and quarterly period fixed effects to control for systematic differences across U.S. states and time periods, such as housing and labor market conditions, or the monetary policy stance.

To start, Table 2 reports regressions of *q* that include the overall loans and overall securities variables with data for 2008.[11] The Securities variable enters with a positive coefficient of 0.096, which suggests that overall securities are valued more highly implicit in bank share prices than on banks' books, though the effects is not statistically significant. The Loans variable also does not enter significantly.

Next, regression 2 in addition includes the real estate loans and MBS variables. Note that the inclusion of both the Real estate loans variable and the Loans variable, which includes real estate loans, implies that the effect of real estate loans is measured relative to that of other loans. Similarly, for MBS, the effect is computed relative to the overall effect for Securities, since MBS are a part of total securities. The real estate loans variable enters with a coefficient of -0.107 that is significant at the 1 percent level

[11] The estimation model implicitly sets the discount on excluded asset categories to zero. Loans and securities included in the regression amount to 89 percent of total assets for the average bank in our sample. Asset categories excluded from the regression are cash-like assets, including cash and federal funds sold and totaling 9 percent of total assets, and non-cash like assets, including trading assets and fixed assets and totaling the remainder of 2 percent of total assets. Thus, with cash-like assets carrying a discount of close to zero and constituting the majority of excluded assets, the implicit assumption of a discount of zero on excluded asset categories appears to be reasonable.

implying that the discount of real estate loans (relative to other loans) is 10.7 percent.[12] The direct effect of real estate loans on Tobin's *q*, computed by adding the coefficients of the Loans and Real estate loans variables, is close to zero, indicating that non-real estate loans carry a negative discount. The MBS variable similarly enters with a coefficient of -0.244 that is significant at the 1 percent level so that MBS appear to be discounted 24.4 percent relative to other securities.[13]

In regression 3, we replace the MBS variable with two separate variables, MBS, held and MBS, for sale that represent the parts of MBS that are held-to-maturity (and carried at amortized cost) and available-for-sale (and carried at fair value). The MBS, held variable obtains a coefficient of -0.321 that is significant at 1 percent, while the MBS, for sale variable enters with a coefficient of -0.227 that is significant at 5 percent. Thus, MBS classified as held-to-maturity appear to be discounted significantly at 32.1 percent, while the MBS available-for-sale tend to have a smaller discount of 22.7 percent on average relative to other securities. Thus, the gap between implicit market prices and accounting values appears to be largest for MBS classified as held-to-maturity.

Finally, in regression 4 we split the MBS, held and MBS, for sale variables into their guaranteed and non-guaranteed parts. Now we see that the guaranteed and non-guaranteed parts of the MBS, held variable are estimated with coefficients of -0.293 and -0.472 that are both significant at the 1 percent level, while the two MBS, for sale variables attract negative coefficients of -0.220 and -0.324 that are smaller in absolute

[12] Real estate loan exposure can lower a bank's q value by reducing expected bank return as well as by increasing bank return risk. Consistent with the latter channel, Knaup and Wagner (2009) find that the sensitivity of bank share prices to a credit default swap index increases in its ratio of real estate loans to total loans.

[13] In this paper we only consider the market valuation of MBS as implicit in share prices. Empirical models of the direct pricing of MBS are offered by Dunn and Singleton (1983), Boudoukh, Richardson, Stanton and Whitelaw (1997), and Schwartz and Torous (1989).

value. Thus, especially the non-guaranteed MBS classified as held-to-maturity are discounted (relative to securities other than MBS). The implied discount of 47.2 percent for these non-guaranteed MBS is sizeable.

The evidence thus points at sizeable market discounts on real-estate related assets relative to book values for U.S. bank holding companies in 2008. As we have data from 2001 onward, it is interesting to see whether such discounts existed before 2008. For this purpose, we re-estimate regression 3 of Table 2 with data for each of the years in the period 2001-2007. The results are reported in Table 3.

Throughout the period 2001 to 2004, none of the real estate asset categories is estimated with a significant discount. From 2005, the real estate loan variable obtains increasingly negative coefficients of -0.074, -0.081 and -0.101 that are significant at the 1 percent level to indicate a gradual deterioration of the implicit market value of real estate loans relative to book value. The MBS variables, however, are not estimated with significant discounts throughout the 2001-2007 period. The deterioration of real estate loans thus appears to have preceded the deterioration of MBS by several years, until in 2008 both asset categories are estimated with significant discounts.

For distressed banks with depressed market values, a further deterioration of asset quality will have relatively little impact on the bank's market value compared to sound banks. At the same time, for these banks asset deterioration could materially increase the bank's implicit claim on the financial safety net in the form of access to cheap capital from public sources. As a result, estimated discounts on impaired real estate assets are expected to be relatively small for distressed banks.

To test this, we re-estimate regression 3 of Table 2 separately for samples of banks with either below or above median value of *q*, defined each quarter. The results are reported as regressions 1 and 2 in Table 4. For the high-valuation banks, real estate loans enters with a coefficient of -0.067 that is significant at the 5 percent level, while the MBS, held and MBS, for sale variables enter with coefficients of -0.342 and -0.327 that are both significant at the 1 percent level. For the low-valuation banks, none of the real estate related variables are estimated with significant coefficients. Thus, the estimated discounts on real estate loans and MBS are only significant for high-valuation banks.

Next, in regression 3 of Table 4 we again consider all banks in the sample, but we now include interaction terms of the real estate loans and MBS, held and MBS, for sale variables with a Low valuation dummy variable that denotes whether or not the *q* of the bank is below the quarterly sample median value of *q*. These interaction terms are expected to obtain positive coefficients to reflect smaller estimated discounts on real estate related assets for low-valuation banks. Indeed, all three interactions terms obtain positive coefficients and the coefficients for the interacted real estate loans and MBS, for sale variables are estimated to be significant in regression 3. Specifically, the discount on real estate assets is estimated to be 8.9 percent smaller for low-valuation banks (while the discount estimated for high-valuation banks is 10.0 percent). At the same time, the estimated discount on MBS, for sale is estimated to be 11.3 percent smaller for low-valuation banks (against an estimated discount for high-valuation banks of 22.7 percent that is statistically significant at the 1 percent level).

Overall these results indicate that discounts on real estate related assets implicit in bank stock prices are, as expected, smaller for low-valuation banks.

We want to make sure that our results are not entirely driven by the size of the bank, given that large banks tend to hold a larger fraction of MBS on their balance sheets. To this end, we re-estimate regression 3 of Table 2 separately for small and large banks by splitting the sample based on whether the Big variable takes a value of zero or one. The results are reported as regressions 4 and 5 in Table 4.

Except for the influence of Loans and Real estate loans, we find little difference in the estimated coefficients of the real-estate related variables for small and large banks. The discount on real estate loans is estimated to be 15.1 percent for large banks and significant at the 1 percent level, while the discount is estimated to be insignificant for small banks. At the same time, non-real estate loans are estimated to carry a premium for small banks. The estimated coefficient on the MBS, held variable is somewhat more negative for small banks, although this variable enters with statistically significant coefficient for both small and large banks. The estimated size of the coefficient on MBS, for sale is more negative for large banks (-0.270) than for small banks (-0.222).

Finally, in regression 6 of Table 4 we again consider all banks in the sample, but we now include interaction terms of the real estate loans and MBS variables with the Big dummy variable that denotes whether the bank is large or small, depending on whether the bank's quarterly assets are above or below the quarterly sample median value of total assets. The regression confirms that the influence of real estate loans is statistically different for large banks compared to small banks. Specifically, the discount on real estate assets is estimated to be 12.7 percent larger for large banks. The estimated discounts for the MBS variables, on the other hand, turn out not to be statistically significantly different between small and large banks.

So far, we have focused on loans and securities and their real estate components. This emphasis is justified by the fact that loans and securities together comprise on average 88.3 percent of bank assets in 2008, and by the fact that real estate assets have suffered from house price declines during the recent financial crisis. Nevertheless, it is interesting to include other on- and off-balance sheet items in the analysis as well.

To start, regressions 1 and 2 of Table 5 include several additional asset categories in regressions 3 and 4 of Table 2. Regression 2 differs from regression 1 by splitting the MBS variables into their guaranteed and non-guaranteed parts. The regressions results indicate that non-guaranteed and held-to-maturity MBS are discounted the most. Trading, denoting the ratio of trading assets to total assets, enters the two regressions with negative but insignificant coefficients. The imprecise estimation of the coefficient on the trading variable could reflect that trading assets, in fact, include many diverse assets and on average comprise only 0.5 percent of total assets in 2008.

Next, regressions 3 and 4 of Table 5 include several liability variables. First, Deposits stands for the ratio of total deposits to total assets. We expect this variable to carry a positive coefficient because banks extract value from the government guarantee on deposits in the presence of deposit insurance that is increasing in the amount of deposits. Indeed, we find that this variable obtains positive though insignificant coefficients in regressions 3 and 4. Second, Deposits, large, short-term stands for the ratio of deposits in excess of $100,000 and with a remaining maturity of one year or less to total assets. These large and short-term deposits can be considered part of the wholesale funding of a bank. The supply of this type of bank funding may be unstable, not least because deposits in excess of $100,000 are traditionally not covered by deposit insurance.

This variable enters with a coefficient of -0.157 in regressions 3 and 4 that is significant at the 5 percent level. This suggests that 1 dollar of these wholesale deposits reduces bank value by about 0.16 dollars (more than other deposits). This, of course, does not mean that the market value of these deposits is substantially different from unity. Rather, a bank that heavily relies on wholesale funding is exposed to considerable funding risk as potentially reflected in bank share prices. Third, the commercial paper variable stands for the ratio of issued commercial paper to total assets. This variable enters with positive but insignificant coefficients in regressions 3 and 4.

Regressions 5 and 6 include a variable that captures the composition of equity capital. Specifically, we include the share of Tier 1 capital in total capital, denoted by the Tier 1 variable. We expect that this variable enters with a positive coefficient, especially for the year 2008, as markets have reassessed the superior value of Tier 1 capital to Tier 2 capital, partly in response to stricter capital requirements proposed by regulators. We indeed find that the Tier 1 capital variable enter with positive coefficients of 0.105 and 0.104 in regressions 5 and 6 that are significant at the 1 percent level. This suggests that a one standard deviation increase of 10 percent in the share of Tier 1 capital in total capital increases bank value by 1 percent, which is not irrelevant given a standard deviation of q of 5 percent. Interestingly, in unreported regressions we find that prior to 2008 the effect of the share of Tier 1 capital on q is not statistically significant, indicating that Tier 1 or core capital became a highly valued component of bank capital only starting in 2008.

We next include several off-balance sheet items in regressions 7 and 8.[14] Credit protection purchased or sold, as reflected in the Credit derivatives, positive and Credit derivates, negative variables, do not enter significantly. The Recourse variable, on the

[14] The variables in the expression for q remain defined as shares of the value of on-balance sheet assets.

other hand, enters with negative and significant coefficients, suggesting that bank value is reduced on account of recourse or credit provided as part of asset securitizations. Similarly, Sponsored enters with a negative and significant coefficient so that bank value negatively reflects credit exposure to other institutions' securitization structures.[15]

Alternatively, banks are punished in terms of their market values for having engaged in certain off-balance sheet activities at all rather than for the exposures that resulted from these activities. This could reflect that investors infer from the existence of such activities a certain risk appetite on the part of management or perhaps likelihood of the build-up of risk in the future.[16] In unreported regressions, we allow for the possibility that bank value depends on the type of off-balance sheet activities that a bank has engaged in (rather than their volumes) by including a set of six dummy variables that are positive, if a bank has engaged in any of the six off-balance sheet activities implied by the six off-balance sheet variables included in regressions 7 and 8. Now only the Recourse, dummy variable enters with a negative and significant coefficient of -0.036, which suggests that overall bank valuation is 3.6 percent less for a bank that has engaged in securitizations that resulted in credit to securitization structures or the possibility of recourse. This confirms that investor reaction to knowledge of this type of off-balance sheet activity on the part of a bank is rather strong.

Comparing the results of regressions 3-4 in Table 2 and regressions 5-8 in Table 5, we see that the inclusion of additional balance sheet and activity variables reduces

[15] For both Recourse and Sponsored, the estimated coefficients are less than -1. This implies, rather oddly, that bank value is reduced more than proportionally by off-balance sheet exposures associated either with own or other institutions' previous securitizations. As seen in Table 1, bank exposures implied by the Recourse and Sponsored variables on average are rather small at on average 0.05 and 0.01 percent of assets in 2008. Thus, bank investors may overestimate the rather small risks that the average bank runs on account of these off-balance sheet obligations stemming from previous securitizations.

[16] Also, it should be noted that only banks with off-balance sheet exposures in excess of certain minimum values are required to report these exposures.

estimated coefficients for the loans and securities variables and renders these variables insignificant. Thus, the implicit stock market valuation of non-real estate loans and securities does not differ significantly from book valuation in Table 5. Real estate related variables, however, continue to obtain negative and significant coefficients in Table 5. The negative coefficient of -0.114 for the real estate loan variable in regression 7 of Table 5, specifically, implies that real estate loans are discounted relative to non-real estate loans as well as relative to book values. Similarly, MBS that are held-to-maturity and available-for-sale are discounted relative to non-MBS securities and relative to book values. Stock markets, which continued to be liquid throughout 2008, reflect the consensus view of many financial market participants.[17] Thus, stock market prices, rather than reflecting 'fire sale' pricing, are the best available information on the value of banks and their asset portfolios. We conclude, therefore, that the accounting values of real estate related assets on the books of banks were inflated in 2008.

4.2 Banks' stock price reaction to amendments of fair value accounting rules

Thus far, we have studied the impact of banks' asset composition on the valuation of banks to gauge the market discounts implicit in different assets. Differences in such market discounts partly reflect differences in accounting treatment. In this section we assess how recent changes to accounting rules have affected the valuation of banks by studying the immediate stock price reaction to the announcements of these rule changes.

On October 10, 2008, the FASB clarified rules for determining the fair value of a financial instrument applying Financial Accounting Standard (FAS) 157 when the market

[17] Morgan (2002) finds that individual bond rating agencies relatively frequently disagree in their rating of bonds issued by banks reflecting their opaqueness.

for that financial asset is not active.[18] The clarification made explicit that the use of a bank's own assumptions about future cash flows and appropriately risk-adjusted discount rates is acceptable when relevant observable inputs into value calculation are not available. Also, it was made clear that broker (or pricing service) quotes may be appropriate input when measuring fair value.[19] These announced interpretations of FAS 157 were seen to provide banks with more discretion in determining the fair value of securities and to enable them to limit mark-downs in the face of illiquid securities markets during the U.S. mortgage default crisis.

Subsequently, on April 9, 2009 the FASB approved amendments to FAS 157 that give banks more discretion in using non-market information to determine fair values of securities.[20] In practice, firms will be allowed to re-classify level 2 assets, which were previously valued using proxy reference market prices, to level 3 assets, whose valuation is model-based.[21] By providing greater flexibility in excluding illiquid transactions from level 2 fair value determination, the new rules effectively expand the scope for firms to prevent significant mark-downs in illiquid markets subject to great price declines, and possibly to mark-up assets that had been aggressively written down previously.[22] Both the

[18] These rules, issued under Final Staff Position on FAS 157-3, were effective upon issuance, including prior periods for which financial statements have not been issued.
[19] The Office of the Chief Accountant of the U.S. Securities and Exchange Commission (SEC) and the FASB staff had already jointly issued a press release on September 30, 2008, that addresses similar application issues of FAS 157. See http://www.fasb.org/news/2008-FairValue.pdf for further details.
[20] The changes became effective for financial statements ending June 2009, with early adoption permitted for first-quarter 2009 results.
[21] See http://www.fasb.org/news/nr040909.shtml for further details.
[22] On the same day, new accounting rules were announced that will reduce the level of losses to be disclosed in firms' income statements for available-for-sale and held-to-maturity debt securities. Under the old rules, provided the firm had the "intent and ability to hold" the security until recovery, "other-than-temporary" impairment would need to be recognized in the income statement. Under the new rules, provided the firm "does not have the intent to sell" the security, it only needs to recognize the credit component of the other-than-temporary impairment in income, while recording the remaining portion in a special category of equity ("other comprehensive income"). The change from "intent and ability to hold" to

October 2008 and April 2009 announcements of the FASB were seen by market commentators as efforts to artificially prop up the accounting value of banks.

In this section, we use a standard event study methodology to compute the average price effect on bank shares of these announcements of changes in accounting rules. Also, we assess whether the share prices of different types of banks reacted differently to these announcements. In particular, we examine whether abnormal returns vary by bank size, Tobin's *q*, and the degree to which banks hold MBS. We use a standard market model to estimate abnormal returns.

Table 6 reports the event study results for the October 10, 2008 announcement. Cumulative abnormal returns are based on a market model with estimation window of [t-250, t-30], where t denotes October 10, 2008, and time is counted in trading days. We use the total return on the S&P 500 as proxy for the daily market return. We report results for two different event windows. Panel A reports results using an event window of (t-3, t+2], where t denotes October 10, 2008, and time is counted in trading days, while Panel B reports results using an event window of (t-1, t]. Using such a short event window of a single day is acceptable given the high stock market volatility around the time of this event, culminating in a stock market crash. To mitigate concerns that returns from illiquid firms are driving the result, we exclude from the sample observations from firms with more than 100 zero returns over the estimation window or a zero return on the event date.

Average cumulative abnormal returns are reported both for the full sample of banks and for different subsamples of banks, with sample splits based on a host of bank characteristics, specifically bank size, Tobin's *q*, and the degree to which banks hold

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"no intention to sell" may provide sufficient flexibility to significantly reduce the level of total impairment, of which only the credit component is deducted from income.

MBS. The sample splits are as follows: Large (small) denotes firms with total assets above (below) the quarterly sample median; High (Low) q denotes firms with Tobin's q above (below) the quarterly sample median; and High (Low) share of MBS denotes firms with MBS as a fraction of total assets above (below) the quarterly sample median. We use third quarter 2008 Call report data to construct these bank-specific variables, while daily total return data on equities are obtained from Datastream.

Table 7 reports event study results for the second event on April 9, 2009. Again, we report results separately for two different event windows in Panels A and B. To avoid valuation effects arising from events that occurred during the period following the announcement of the first event, including the first event itself, from biasing the market model induced estimates of normal returns, we apply the same estimation window as used in the first event study to estimate normal returns.

The cumulative abnormal returns (CAR) are large on the event day itself for both events but in the case of the first event, the average CAR across all banks is much lower and barely significant if we extend the event window. The reason is that October 10, 2008 was the only day that week during which the stock market experienced positive returns in what otherwise was a rapidly falling market, in which the prices of bank stocks were falling more sharply than those of non-bank stocks.

The sample splits reveal a number of interesting differences in the valuation effect across different types of banks. The CAR of large banks is consistently higher and economically large. One explanation for this result is that larger U.S. banks tend to have a larger fraction of hard-to-value assets, including off-balance sheet, and thus tend to benefit most from the changes in accounting rules.

In terms of valuation, the results are ambiguous. The share price of banks with above-median Tobin's *q* reacted favorably to the October 10, 2008 event but we do not find such effect for the April 9, 2009 event. The impact of this type of news on banks with low or high Tobin's *q* is theoretically ambiguous. If banks have low Tobin's *q* on account of high impaired real estate exposure (rather than high impaired MBS exposure), then the banks stand to gain little from an accounting change that primarily benefits banks with large exposure to MBS. This could explain the results on October 10, 2008. However, if banks have low Tobin's *q* on account of high exposure to impaired MBS, then they may benefit more from good news related to MBS simply because they have more of such assets, and we expect their share price to react more favorably. This can explain the results on April 9, 2009, as then banks with low Tobin's *q* do slightly better, though the difference is not statistically significant. We know from results presented in the previous section of this paper that discounts in share prices on account of MBS only arose in 2008. An increase in the discount of MBS relative to that of real estate loans between October 2008 and April 2009 could explain the ambiguous impact of Tobin's *q*.

Finally, we find that the share price of banks with a large fraction of MBS react favorably to the relaxation of fair value accounting, at least for the October 10, 2008 event, as expected.

Overall, we find that the valuation of large banks and banks with a large fraction of MBS gains relatively much on account of both announcements. This can be explained by the fact that these banks have relatively many assets such as MBS that are affected by more lenient rules regarding the calculation of their fair value.

5. Accounting discretion on impaired assets and asset classification

In this section, we assess the relevance of banks' discretion in accounting for bad loans and in classifying MBS into categories that render more favorable accounting values. Together with the valuation results presented in section 4, these results shed light on the reliability of banks' financial statements, and in particular on the extent to which book values of banks' assets accurately account for future asset impairment.

5.1 Accounting discretion on accounting for bad loans

The relative importance of real estate assets in the average bank's portfolio renders bank capital very sensitive to the performance of real estate loans. In case of expected future loan losses, a bank needs to provision for these losses. Provisioning for loan losses, however, reduces income and regulatory capital. Thus, distressed banks may be tempted to provision relatively less for real estate loans or any other loans in an attempt to overstate capital.[23]

In this subsection, we report regressions that test whether distressed banks report relatively low loan loss provisions. To capture loan loss provisioning, we construct the ratio of loan loss provisions to total loans.[24] We obtain data on loan charge-offs and provisions from Schedule HI-B of the Call report files.

In regression 1 of Table 8, the loan loss provisioning variable is first related to the share of real estate loans in total loans. We expect loan loss provisioning to be positively related to the share of real estate loans, as these loans have been particularly affected by

[23] Previously, Moyer (1990) and Ahmed et al. (1999) have found that banks use their discretion regarding loan loss provisioning to manage their capital. Docking et al. (1997) consider the information and contagion effects of bank loan loss reserve announcements.

[24] No breakdown of loan loss provisioning for real estate loans and other loan categories is available from banks' Call reports.

recent house price declines. The share of real estate loans indeed enters the regression with a positive coefficient, but it is statistically insignificant.

Banks that need to absorb large losses arising from exposure to MBS may lower their provisioning standards in an effort to preserve capital. As a proxy for potential losses arising from exposure to MBS, we use the ratio of MBS to assets denoted MBS. This exposure variable obtains a negative coefficient of -0.015 that is statistically significant at the 5 percent level, suggesting that banks with large MBS exposure tend to attenuate reported loan loss provisions.

Regressions 2 and 3 re-estimate regression 1 for the samples of banks with below-median and above-median *q*, respectively. Regression 2 confirms a negative and statistically significant coefficient for the MBS variable, while the coefficient for the MBS variable is negative but insignificant in regression 3. Thus, low-*q* banks appear to be the ones that compensate for their MBS exposure by scaling back their loan loss provisioning.

Distressed banks also may be slow in recognizing losses on their real estate loan portfolio in the form of write-downs[25] or charge-offs.[26] To analyze this, regressions 4 to 6 in the table take as the dependent variable the ratio of net charge-offs to loans (where net charge-offs are the difference between charge-offs and recoveries). Otherwise, regressions 4 to 6 are similar to regressions 1 to 3. Consistent with the earlier results, we now find that the ratio of net charge-offs to loans is negatively related to the MBS variable, though the effect is not statistically significant.

[25] Loan writedowns include writedowns arising from transfers of loans to a held-for-sale account.
[26] Loan charge-offs reduce allowances for loan losses rather than bank capital if previous loan loss provisions were made. In any case, charge-offs may trigger further loan loss provisioning which reduces regulatory capital.

In sum, we find evidence that low-valuation banks with large MBS exposures are found to hold back on their loan loss provisioning.

5.2 Classification of mortgage-backed securities

According to FAS 159, banks have the option to classify securities as held-to-maturity or available-for-sale. Securities are to be classified as held-to-maturity and carried at amortized cost, if management has the intention to hold them until maturity. Otherwise, securities are available-for-sale and carried at fair value. This classification is to be made on the date of purchase of the security and it is in principle irreversible. On the purchase date, amortized cost and fair value should be essentially the same and hence no valuation advantage can be obtained by classifying securities either way.[27]

Reclassification of previously acquired securities potentially does affect the overall book value of securities. Specifically, overall book value rises if available-for-sale securities are reclassified as held-to-maturity at a time when amortized cost exceeds fair value. In 2008, the mean ratio of fair value to amortized cost for non-guaranteed MBS was 0.927, against a mean ratio of fair value to amortized cost for guaranteed MBS of 1.005. These accounting valuations gave banks an incentive to classify non-guaranteed MBS as held-to-maturity to the extent possible. In this section, we examine whether banks, and especially distressed banks, responded to this incentive by classifying a larger fraction of their MBS as held-to-maturity.

Table 9 reports regressions of the shares of MBS that are held-to-maturity for guaranteed as well as non-guaranteed securities. In the calculation of these shares, the MBS that are actually available-for-sale are also valued at amortized cost. The number of

[27] A consideration guiding this classification at the time of securities acquisition can be to obtain an appropriate mix of assets and liabilities that are carried at fair value.

observations differs depending on whether the dependent variable is computed for guaranteed or non-guaranteed securities because a significant fraction of banks reports not to have any non-guaranteed MBS. The fraction of MBS that is held-to-maturity increases from 7.5 percent at end-2007 to 11.7 percent at end-2008, consistent with the notion that banks had incentives during the year 2008 to classify a larger fraction of their MBS as held-to-maturity.

The regression 1 results indicate that the share of guaranteed MBS classified as held-to-maturity is positively but insignificantly related to both the real estate loans and the overall MBS (valued at amortized cost) to assets variables. In regression 2, we see that the non-guaranteed share of MBS that is held-to-maturity is positively and insignificantly related to the MBS, amortized cost variable but positively and significantly to the real estate loans variable with a coefficient of 0.731.

Thus, we find evidence that banks pressured by real estate exposure tend to report a relatively large share of non-guaranteed MBS as held-to-maturity, and that this effect operated chiefly through exposure to real estate loans rather than MBS.

Regressions 3 and 4 differ from regressions 1 and 2 in that we include the Low valuation variable as an additional variable to assess differences in the classification of MBS between banks with high or low *q*. The Low valuation variables enters both regressions with a positive but insignificant coefficient, indicating that there is no significant difference between high and low valuation banks in the fraction of non-guaranteed MBS that they report as held-to-maturity.

Finally, regressions 5 and 6 differ from regressions 3 and 4 in that we include interaction terms of the real estate exposure variables and the Low valuation variable.

Positive estimated coefficients imply that especially banks with below-average *q* report a larger share of their MBS as held-to-maturity in response to large real estate exposures. Indeed, the interaction terms in regressions 5 and 6 all enter with positive estimated coefficients, although the coefficients are statistically significant only for the interaction with the MBS variable in regression 6. This suggests that banks with below-average *q* increase the share of non-guaranteed MBS that is held-to-maturity to a relatively large extent in response to real estate exposures. This is to be expected as the gains in terms of the book value of assets are relatively large in the case of non-guaranteed MBS, as for these securities the ratio of fair value to amortized cost was relatively low in 2008.

Next, we examine whether banks have also exploited discretion in the classification of their MBS with a view to boost the accounting value of their assets prior to 2008. To do this, we re-estimate regression 4 of Table 9 with data for each of the years in the period 2001-2007. A focus on non-guaranteed MBS is justified, as the ratio of fair value to amortized cost of these MBS deviates relatively frequently from unity as seen in Figure 4. In 2001, for instance, fair values of non-guaranteed MBS tended to exceed amortized cost. The results are presented in Table 10.

The MBS, amortized variable enters the regressions in Table 10 with either negative or positive coefficient, depending on the year, although none of these estimated coefficients is statistically significantly different from zero.

The real estate loan variable enters the regressions in Table 10 with positive coefficients that are significant at the 5 percent level from the year 2005 onwards, suggesting that banks with large real estate exposure classified a larger fraction of their

non-guaranteed MBS as held-to-maturity. Over the 2002-2008 period, the real estate loans variable increases in a non-monotonic way from 0.137 to 0.457.

Turning to the Low valuation variable, we find that this variable enters with positive but insignificant coefficients for the years 2001 through 2004 that turn negative from the year 2005 onwards. Overall, the results for the period 2001-2007 confirm that also prior to 2008 banks classified their non-guaranteed MBS with a view to boasting the book value of these assets.

6. Conclusions

In 2008, the majority of U.S. banks were zombie banks as evidenced by market values of bank assets being lower than their book values. This is *prima facie* evidence that the book value of banks' balance sheets is inflated. In this paper, we find that the stock market attaches less value to real estate loans and MBS than their accounting values. This discrepancy between the accounting and market value of bank assets suggests that banks have been slow to adjust the book value of their assets to conform to market expectations about future declines in asset values.

We further find a relatively high discount for MBS that are held-to-maturity (and carried at amortized cost) relative to MBS that are available-for-sale (and carried at fair value). This suggests that fair values recognize the impairment of MBS to a greater extent than amortized costs do.

Share values of distressed banks, as indicated by a below-average Tobin's *q*, are reduced relatively little by exposures to real-estate related assets. This suggests that low-valuation banks with large real-estate related exposure derive relatively large benefits

from the financial safety net, for instance in the form of access of cheap public loans and other capital, to offset asset impairment.

We estimate valuations implicit in bank share prices for a range of bank liabilities and off-balance sheet items as well. Bank share prices are found to negatively reflect bank funding in the form of large and short-term deposits. This may reflect that 'wholesale' funding of this type exposes the bank to considerable funding risks. Bank share prices are further found to be affected by off-balance sheet items such as credit insurance bought and sold, as well as credit commitments to own and other financial institutions' securitization structures.

A major concern has been that fair value accounting of bank assets has procyclical implications for credit supply with credit expanding at a time of rising asset prices and contracting when asset prices fall (see IMF, 2009, and Heaton et al., 2009). Procyclicality can arise when higher asset prices lead to the recognition of gains on bank assets, augmenting bank capital and rendering further credit expansion possible. In this paper, we do not directly address this issue as we do not examine the variability of amortized costs versus fair values over a typical asset boom and bust cycle. However, we find that at a time of depressed asset prices such as in 2008, one year into the U.S. mortgage crisis, the stock market applies discounts to banks that are larger than those implicit in the fair values of MBS. This suggests that fair value accounting, as currently implemented, is still less procyclical than any accounting based exclusively on stock market valuations would be.[28]

[28] At any rate, in our view the main task of accounting systems is to provide reliable information, and this goal should not be compromised by concerns about any procyclicality of credit supply. A common view is that bank regulation should target any undesirable credit procyclicality directly, for instance by prescribing

In October 2008 and April 2009, the FASB announced sets of accounting rule amendments providing banks with additional discretion in the determination of fair value of securities in case markets are illiquid and transaction prices may result from 'fire sales'. On both occasions, banks with large exposures to MBS are found to have experienced relatively large excess returns. Additional discretion in the determination of fair values in an environment of depressed asset prices makes it easier for banks with large affected exposures to maintain accounting solvency, which is apparently cheered by bank equity investors.

This paper further demonstrates that banks with large exposures to MBS systematically use their accounting discretion so as to inflate asset values and book capital. Specifically, banks with large exposure to MBS are found to report relatively low loan loss provisioning rates and loan charge-off rates, and at the same time they tend to classify a relatively large share of their MBS as held-to-maturity, to be able to carry these assets at amortized costs.

Our finding that distressed banks tend to exploit their discretion in loan loss provisioning, loan charge-offs, and classification of MBS to boost their accounting value should be reason for concern, as it implies that the discretion implicit in current accounting rules lead to systematic biases in valuations on bank balance sheets. Accounting discretion enables banks with impaired asset portfolios to satisfy capital adequacy requirements, but it makes it difficult to assess the true health of the affected banks. Replacing accounting discretion by more rules-based accounting could serve to improve the information value of public accounts. Banks could be required, for instance,

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cyclical capital requirements (for a more detailed discussion of this debate, see Laeven and Majnoni, 2003, Kashyap and Stein, 2004, and Repullo and Suarez, 2008).

to carry all their MBS at fair value, obviating incentives to reclassify MBS between different categories. Similarly, a more rules-based approach to provisioning for bad loans could mitigate incentives for banks to use current discretion on loan loss provisioning rates to inflate the book value of assets and capital during economic downturns. The debate about the pros and cons of fair value accounting will likely go on for a while, although historical cost accounting is unlikely to be the remedy, as fair values are potentially more informative, even if fair value calculations themselves are also subject to discretion by banks.

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Appendix. Variable definitions and data sources

Variable	Definition	Source
Tobin's q	Ratio of market value of common equity plus book value of preferred equity and liabilities to book value of assets	Call report and Datastream
Share of MBS held-to-maturity, guaranteed	Share of guaranteed mortgage-backed securities (MBS) that is held-to-maturity	Call report
Share of MBS held-to-maturity, not guaranteed	Share of non guaranteed MBS that is held-to-maturity	Call report
Loans	Ratio of loans to assets	Call report
Real estate loans	Ratio of real estate loans to assets	Call report
Securities	Ratio of securities to assets. Securities held-to-maturity are at amortized cost and securities available-for-sale are at fair value	Call report
Securities, amortized cost	Ratio of securities to assets. Securities are at amortized cost if they are both held-to-maturity and available-for-sale	Call report
MBS	Ratio of MBS to assets. Held-to-maturity securities are at amortized cost and available-for-sale securities are at fair value	Call report
MBS, amortized	Ratio of MBS to assets. Both held-to-maturity and available-for-sale MBS are at amortized cost	Call report
MBS, held	Ratio of MBS that are held-to-maturity to assets	Call report
MBS, for sale	Ratio of MBS that are available-for-sale to assets	Call report
MBS, held, guaranteed	Ratio of MBS that are held-to-maturity and issued or guaranteed by FNMA, FHLMC, and GNMA to assets	Call report
MBS, held, not guaranteed	Ratio of non-guaranteed MBS that are held-to-maturity to assets	Call report
MBS, for sale, guaranteed	Ratio of MBS that are available-for-sale and issued or guaranteed by FNMA, FHLMC, and GNMA to assets	Call report
MBS, for sale, not guaranteed	Ratio of non-guaranteed MBS that are available-for-sale to assets	Call report
Big	Dummy variable that is one if assets are above mean of assets in the data set and zero otherwise	Call report
HPI	State-level housing price index, rescaled to index value of 1	OFHEO
Low valuation	Dummy variable that equals 1 if Tobin's q is less than 1, and 0 otherwise	Call report
Trading	Ratio of assets in trading account to total assets	Call report
Deposits	Ratio of deposits to assets	Call report
Deposits, large, short-term	Ratio of time deposits of $100,000 or more with a remaining maturity of one year or less to assets	Call report
Commercial paper	Ratio of commercial paper to assets	Call report
Tier 1	Ratio of tier 1 capital in total capital	Call report
Credit derivatives, positive	Ratio of notional amount of credit derivatives for which the bank is the beneficiary (credit protection purchased) to assets	Call report
Credit derivatives, negative	Ratio of notional amount of credit derivatives for which the bank is the guarantor (credit protection extended) to assets	Call report
Securitized	Ratio of outstanding principal balance of assets sold and securitized with servicing retained or with recourse or other seller-provided credit enhancements to assets	Call report
Recourse	Ratio of maximum amount of credit exposures arising from recourse or other seller-provided credit enhancements provided to securitization structures to assets	Call report
Sponsored	Ratio of maximum amount of credit exposure arising from credit enhancements provided to other institutions' securitization structures to assets	Call report
Sales	Ratio of assets sold with recourse or other seller-provided credit enhancements and not securitized to assets	Call report
Loan loss provisioning	Ratio of loan loss provisioning to loans	Call report
Net charge-offs	Ratio of loan charge-offs minus recoveries to loans	Call report
Share of real estate loans	Share of real estate loans in total loans	Call report

Table 1. Summary statistics for 2008, quarterly data

See the appendix for variable definitions and data sources.

	Mean	St. dev.	Minimum	Maximum	Number
Tobin's *q*	1.0133	0.0550	0.8976	1.3280	1152
Share of MBS held-to-maturity, guaranteed	0.0628	0.1844	0	1	1118
Share of MBS held-to-maturity, not guaranteed	0.0957	0.2501	0	1	598
Loans	0.7142	0.1170	0.0517	0.9593	1152
Real estate loans	0.5360	0.1453	0	0.8880	1152
Securities	0.1686	0.0987	0	0.7702	1152
MBS	0.0959	0.0777	0	0.5758	1152
MBS, held	0.0083	0.0319	0	0.3594	1152
MBS, for sale	0.0876	0.0699	0	0.4456	1152
MBS, held, guaranteed	0.0071	0.0289	0	0.3577	1152
MBS, held, not guaranteed	0.0012	0.0113	0	0.2006	1152
MBS, for sale, guaranteed	0.0798	0.0642	0	0.4009	1152
MBS, for sale, not guaranteed	0.0078	0.0174	0	0.1592	1152
Big	0.4983	0.5002	0	1	1152
HPI	3.9383	1.2065	2.0982	6.9824	1132
Low valuation	0.4991	0.5002	0	1	1152
Trading	0.0053	0.0253	0	0.2996	1152
Deposits	0.7194	0.1088	0.1227	0.9028	1152
Deposits, large, short-term	0.0250	0.0317	0	0.3580	1152
Commercial paper	0.0010	0.0052	0	0.0628	1152
Tier 1	0.8634	0.0816	0.5000	1	1152
Credit derivatives, positive	0.0147	0.1571	0	2.9420	1152
Credit derivatives, negative	0.0142	0.1515	0	2.8203	1152
Securitized	0.0145	0.0756	0	0.7292	1152
Recourse	0.0005	0.0053	0	0.0926	1152
Sponsored	0.0001	0.0014	0	0.0275	1152
Sales	0.0032	0.0130	0	0.1440	1152
Credit derivatives, positive, dummy	0.0582	0.2341	0	1	1152
Credit derivatives, negative, dummy	0.0582	0.2341	0	1	1152
Securitized, dummy	0.1285	0.3348	0	1	1152
Recourse, dummy	0.0642	0.2453	0	1	1152
Sponsored, dummy	0.0200	0.1399	0	1	1152
Sales, dummy	0.2882	0.4531	0	1	1152
Loan loss provisioning	0.0077	0.0107	-0.0004	0.1435	1152
Net charge-offs	0.0050	0.0077	-0.0009	0.0906	1152
Share of real estate loans	0.7429	0.1480	0	1	1152

Table 2. Tobin's *q* and real estate related assets in 2008

The dependent variable is Tobin's *q*. See the appendix for variable definitions and data sources. Regressions include state fixed effects and quarterly period fixed effects (not reported). Data are based on quarterly observations. Standard errors are corrected for clustering at the bank level. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

	(1)	(2)	(3)	(4)
Loans	-0.038	0.101*	0.097*	0.090*
	(0.052)	(0.053)	(0.054)	(0.054)
Real estate loans		-0.107***	-0.103***	-0.101***
		(0.031)	(0.031)	(0.031)
Securities	0.096	0.277***	0.278***	0.274***
	(0.060)	(0.084)	(0.085)	(0.085)
MBS		-0.244***		
		(0.088)		
MBS, held			-0.321***	
			(0.086)	
MBS, for sale			-0.227**	
			(0.095)	
MBS, held, guaranteed				-0.293***
				(0.089)
MBS, held, not guaranteed				-0.472***
				(0.105)
MBS, for sale, guaranteed				-0.220**
				(0.096)
MBS, for sale, not guaranteed				-0.324*
				(0.195)
Big	0.007	0.008	0.008	0.008
	(0.006)	(0.006)	(0.006)	(0.006)
HPI	0.000	0.001	0.001	0.000
	(0.007)	(0.007)	(0.006)	(0.007)
Constant	1.025***	0.954***	0.956***	0.963***
	(0.0435)	(0.0411)	(0.0413)	(0.0419)
N	1132	1132	1132	1132
R^2	0.317	0.373	0.375	0.377

Table 3. Tobin's *q* and real estate related assets in 2001-2007

The dependent variable is Tobin's *q*. See the Appendix for variable definitions and data sources. Regressions include state fixed effects and quarterly period fixed effects (not reported). Data are based on quarterly observations. Standard errors are corrected for clustering at the bank level. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

	2001	2002	2003	2004	2005	2006	2007
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Loans	0.197	0.127***	0.063	0.114**	0.166***	0.124*	0.085
	(0.136)	(0.047)	(0.053)	(0.050)	(0.052)	(0.065)	(0.064)
Real estate loans	-0.070	-0.005	0.016	-0.041	-0.074**	-0.081**	-0.101***
	(0.048)	(0.035)	(0.034)	(0.034)	(0.030)	(0.033)	(0.033)
Securities	0.131	0.076	0.063	0.069	0.092*	0.077	0.077
	(0.121)	(0.054)	(0.055)	(0.051)	(0.051)	(0.065)	(0.068)
MBS, held	-0.041	0.066	0.017	-0.034	-0.069	-0.049	-0.086
	(0.087)	(0.080)	(0.085)	(0.063)	(0.058)	(0.069)	(0.080)
MBS, for sale	-0.088	-0.032	-0.041	0.001	-0.016	-0.037	-0.089
	(0.072)	(0.057)	(0.048)	(0.049)	(0.050)	(0.057)	(0.068)
Big	0.063***	0.057***	0.034***	0.034***	0.020***	0.019***	0.009*
	(0.009)	(0.007)	(0.006)	(0.006)	(0.005)	(0.006)	(0.005)
HPI	0.022	-0.024	0.008	0.013*	0.006	0.005	0.035***
	(0.014)	(0.023)	(0.014)	(0.007)	(0.008)	(0.017)	(0.010)
Constant	0.832***	0.972***	0.990***	0.978***	0.962***	1.001***	0.947***
	(0.116)	(0.057)	(0.052)	(0.039)	(0.040)	(0.067)	(0.054)
N	286	1186	1250	1274	1297	1169	1172
R^2	0.371	0.337	0.257	0.311	0.327	0.316	0.354

Table 4. Tobin's *q* and real estate related assets in 2008: sample splits by valuation and asset size

The dependent variable is Tobin's *q*. See the Appendix for variable definitions and data sources. Subsample in Column (1) consists of banks with below-median Tobin's Q in a given quarter. Subsample in Column (2) consists of banks with above-median Tobin's *q* in a given quarter. Subsample in Column (3) consists of banks with below-median total assets in a given quarter. Subsample in Column (2) consists of banks with above-median total assets in a given quarter. Regressions include state fixed effects and quarterly period fixed effects (not reported). Data are based on quarterly observations. Standard errors are corrected for clustering at the bank level. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

	Low valuation	High valuation	Interactions with Low valuation	Small	Large	Interactions with Big
	(1)	(2)	(3)	(4)	(5)	(6)
Loans	0.028	-0.007	0.007	0.233***	0.117	0.146**
	(0.029)	(0.080)	(0.034)	(0.078)	(0.071)	(0.058)
Real estate loans	-0.020	-0.067**	-0.100***	-0.053	-0.151***	-0.035
	(0.018)	(0.031)	(0.026)	(0.037)	(0.045)	(0.036)
Real estate loans * Low valuation			0.089***			
			(0.030)			
Real estate loans * Big						-0.127**
						(0.053)
Securities	0.024	0.211*	0.120*	0.375***	0.394***	0.346***
	(0.040)	(0.127)	(0.063)	(0.077)	(0.133)	(0.091)
MBS, held	-0.006	-0.342***	-0.225*	-0.409***	-0.274*	-0.433***
	(0.048)	(0.119)	(0.115)	(0.107)	(0.151)	(0.104)
MBS, held * Low valuation			0.078			
			(0.140)			
MBS, held * Big						0.210
						(0.135)
MBS, for sale	-0.003	-0.327***	-0.227***	-0.222**	-0.270*	-0.280***
	(0.041)	(0.117)	(0.088)	(0.095)	(0.143)	(0.100)
MBS, for sale * Low valuation			0.113*			
			(0.067)			
MBS, for sale * Big						0.070
						(0.096)
Low valuation			-0.126***			
			(0.021)			
Big	-0.003	0.007	0.002			0.071*
	(0.003)	(0.008)	(0.004)			(0.037)

HPI	-0.000	0.003	0.001	-0.001	0.006	0.003
	(0.006)	(0.012)	(0.006)	(0.010)	(0.008)	(0.006)
Constant	0.996***	1.035***	1.100***	0.832***	0.972***	0.874***
	(0.028)	(0.060)	(0.033)	(0.060)	(0.051)	(0.052)
N	562	570	1132	578	554	1132
R^2	0.322	0.416	0.658	0.408	0.495	0.403

Table 5. Tobin's *q* and additional balance sheet and off-balance sheet items

The dependent variable is Tobin's *q*. See the Appendix for variable definitions and data sources. Regressions include state fixed effects and quarterly period fixed effects (not reported). Data are based on quarterly observations. Standard errors are corrected for clustering at the bank level. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Loans	0.042	0.035	0.023	0.018	0.021	0.019	0.013	0.015
	(0.080)	(0.080)	(0.084)	(0.084)	(0.079)	(0.079)	(0.076)	(0.077)
Real estate Loans	-0.103***	-0.102***	-0.093***	-0.092***	-0.102***	-0.100***	-0.114***	-0.113***
	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.030)	(0.030)
Securities	0.211*	0.206*	0.194*	0.191*	0.140	0.141	0.109	0.112
	(0.114)	(0.114)	(0.115)	(0.115)	(0.116)	(0.117)	(0.115)	(0.115)
MBS, held	-0.312***		-0.292***		-0.280***		-0.271***	
	(0.086)		(0.087)		(0.085)		(0.084)	
MBS, for sale	-0.215**		-0.200**		-0.174*		-0.160*	
	(0.096)		(0.095)		(0.095)		(0.095)	
MBS, held, guaranteed		-0.286***		-0.270***		-0.260***		-0.250***
		(0.089)		(0.090)		(0.089)		(0.088)
MBS, held, not guaranteed		-0.448***		-0.420***		-0.389***		-0.370***
		(0.109)		(0.107)		(0.106)		(0.113)
MBS, for sale, guaranteed		-0.207**		-0.194**		-0.174*		-0.163*
		(0.098)		(0.096)		(0.095)		(0.096)
MBS, for sale, not guaranteed		-0.329*		-0.286		-0.187		-0.099
		(0.194)		(0.207)		(0.211)		(0.210)
Trading	-0.189	-0.190	-0.164	-0.168	-0.144	-0.142	-0.105	-0.100
	(0.136)	(0.135)	(0.164)	(0.166)	(0.154)	(0.157)	(0.161)	(0.162)
Deposits			0.046	0.044	0.033	0.032	0.024	0.024
			(0.051)	(0.052)	(0.050)	(0.051)	(0.051)	(0.052)
Deposits, large, short-term			-0.157**	-0.157**	-0.162**	-0.161**	-0.163**	-0.162**
			(0.079)	(0.079)	(0.078)	(0.078)	(0.078)	(0.078)
Commercial paper			0.502	0.506	0.605*	0.604*	0.542*	0.535*
			(0.320)	(0.324)	(0.316)	(0.317)	(0.307)	(0.302)
Tier 1					0.105***	0.104***	0.095***	0.095***
					(0.032)	(0.033)	(0.033)	(0.034)
Credit derivatives, positive							0.039	0.038
							(0.218)	(0.216)

Credit derivatives, negative							-0.043	-0.042
							(0.218)	(0.216)
Securitized							0.010	0.010
							(0.026)	(0.027)
Resource							-5.394**	-5.482**
							(2.393)	(2.354)
Sponsored							-2.211***	-2.202***
							(0.532)	(0.533)
Sales							-0.101	-0.106
							(0.218)	(0.222)
Big	0.008	0.008	0.009	0.009	0.012*	0.012*	0.012*	0.013*
	(0.006)	(0.006)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)
HPI	0.002	0.001	0.003	0.003	0.004	0.003	0.004	0.003
	(0.007)	(0.007)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Constant	1.001***	1.008***	0.969***	0.976***	0.894***	0.898***	0.928***	0.926***
	(0.064)	(0.064)	(0.082)	(0.084)	(0.073)	(0.077)	(0.074)	(0.077)
N	1132	1132	1132	1132	1132	1132	1132	1132
R^2	0.379	0.380	0.388	0.389	0.401	0.401	0.414	0.414

Table 6. Event study of new FASB rules on fair value accounting for illiquid assets (FAS 157), announced on October 10, 2008.

This table reports average cumulative abnormal returns for different subsamples of firms. Cumulative abnormal returns are based on a market model with estimation window of [t-250, t-30], where t denotes October 10, 2008, and time is counted in trading days. Panel A reports results using an event window of (t-3, t+2], where t denotes October 10, 2008, and time is counted in trading days, while Panel B reports results using an event window of (t-1, t]. Observations from firms with more than 100 zero returns over the estimation window or a zero return on the event date are excluded from the sample. Large (small) denotes firms with total assets above (below) the quarterly sample median. High (Low) *q* denotes firms with Tobin's *q* above (below) the quarterly sample median. High (Low) share of MBS denotes firms with mortgage-backed securities as a fraction of total assets above (below) the quarterly sample median. Standard errors of the average cumulative abnormal returns are reported in parentheses. ***,**, and * denote significance at the 1%, 5%, and 10% level, respectively.

Panel A: Event window is October 8, 2008 until October 12, 2008

	(1) All firms	(2) Large	(3) Small	(4) Low *q*	(5) High *q*	(6) Low share of MBS	(7) High share of MBS
CAR	0.0128*	0.0260***	-0.000523	0.00528	0.0203***	0.0116	0.0140
	(0.00703)	(0.00924)	(0.0105)	(0.0123)	(0.00700)	(0.0111)	(0.00874)
Observations	270	136	134	134	136	134	136

Panel B: Event window is October 10, 2008

	(1) All firms	(2) Large	(3) Small	(4) Low *q*	(5) High *q*	(6) Low share of MBS	(7) High share of MBS
CAR	0.0761***	0.129***	0.0225**	0.0371***	0.114***	0.0616***	0.0903***
	(0.00735)	(0.00786)	(0.0107)	(0.0113)	(0.00817)	(0.0113)	(0.00937)
Observations	270	136	134	134	136	134	136

Table 7. Event study of FASB amendments to fair value accounting of hard-to-value assets, announced on April 9, 2009.

This table reports average cumulative abnormal returns for different subsamples of firms. Cumulative abnormal returns are based on a market model with estimation window of [t-250, t-30], where t denotes October 10, 2008, and time is counted in trading days. Panel A reports results using an event window of (t-3, t+2], where t denotes April 9, 2009, and time is counted in trading days, while Panel B reports results using an event window of (t-1, t]. Observations from firms with more than 100 zero returns over the estimation window or a zero return on the event date are excluded from the sample. Large (small) denotes firms with total assets above (below) the quarterly sample median. High (Low) *q* denotes firms with Tobin's *q* above (below) the quarterly sample median. High (Low) share of MBS denotes firms with mortgage-backed securities as a fraction of total assets above (below) the quarterly sample median. Standard errors of the average cumulative abnormal returns are reported in parentheses. ***,**, and * denote significance at the 1%, 5%, and 10% level, respectively.

Panel A: Event window is April 7, 2009 until April 11, 2009

	(1) All firms	(2) Large	(3) Small	(4) Low *q*	(5) High *q*	(6) Low share of MBS	(7) High share of MBS
CAR	0.0643***	0.0899***	0.0390***	0.0768***	0.0519***	0.0632***	0.0654***
	(0.00660)	(0.00920)	(0.00895)	(0.0115)	(0.00635)	(0.00944)	(0.00927)
Observations	255	127	128	127	128	127	128

Panel B: Event window is April 9, 2009

	(1) All firms	(2) Large	(3) Small	(4) Low *q*	(5) High *q*	(6) Low share of MBS	(7) High share of MBS
CAR	0.0499***	0.0662***	0.0337***	0.0529***	0.0469***	0.0497***	0.0501***
	(0.00425)	(0.00540)	(0.00627)	(0.00739)	(0.00428)	(0.00668)	(0.00531)
Observations	255	127	128	127	128	127	128

Table 8. Loan loss provisions and net loan charge-offs in 2008

The dependent variable is the ratio of loan loss provisioning to loans in Columns (1)-(3) and the ratio of loan charge-offs minus recoveries to loans in Columns (4)-(6). See the Appendix for variable definitions and data sources. Subsample in Columns (2) and (5) consists of banks with below-median Tobin's *q* in a given quarter. Subsample in Columns (3) and (6) consists of banks with above-median Tobin's Q in a given quarter. Regressions include state fixed effects and quarterly period fixed effects (not reported). Data are based on quarterly observations. Standard errors are corrected for clustering at the bank level. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

	Loan loss provisioning			Net loan charge-offs		
	All banks	Low valuation	High valuation	All banks	Low valuation	High valuation
	(1)	(2)	(3)	(4)	(5)	(6)
Share of real estate loans	0.004	0.000	0.000	0.003	-0.001	0.000
	(0.005)	(0.008)	(0.002)	(0.003)	(0.005)	(0.002)
MBS	-0.015**	-0.024*	-0.002	-0.008	-0.010	-0.000
	(0.007)	(0.013)	(0.005)	(0.005)	(0.009)	(0.004)
Big	0.004***	0.008***	0.001*	0.003***	0.005***	0.001
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.000)
HPI	-0.005**	-0.001	-0.009***	-0.005**	-0.003	-0.006**
	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)
Constant	0.013*	0.000	0.030***	0.012*	0.008	0.019***
	(0.008)	(0.012)	(0.007)	(0.006)	(0.010)	(0.007)
N	1132	562	570	1132	562	570
R^2	0.344	0.440	0.413	0.310	0.421	0.305

Table 9. Share of mortgage-backed securities that is held-to-maturity in 2008

The dependent variable is the share of mortgage-backed securities that is held-to-maturity. Low valuation is a dummy variable that takes a value of one if the bank has a Tobin's *q* less than one, and zero otherwise. See the Appendix for variable definitions and data sources. Regressions include state fixed effects and quarterly period fixed effects (not reported). Data are based on quarterly observations. Standard errors are corrected for clustering at the bank level. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

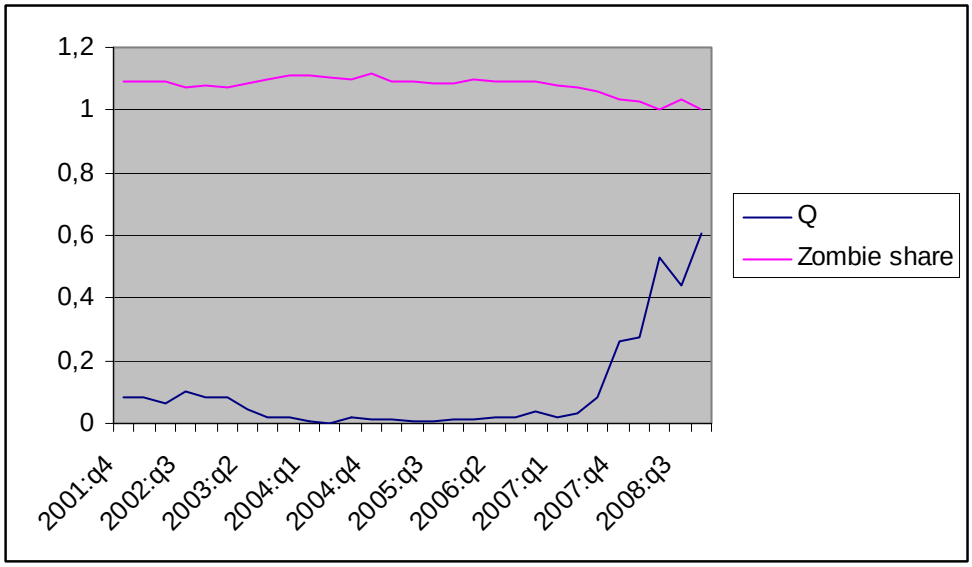
	Guaranteed	Not guaranteed	Guaranteed	Not guaranteed	Guaranteed	Not guaranteed
	(1)	(2)	(3)	(4)	(5)	(6)
Loans	0.030	-0.913***	0.068	-0.855***	0.073	-0.914***
	(0.268)	(0.284)	(0.274)	(0.269)	(0.273)	(0.292)
Real estate loans	0.031	0.731***	0.015	0.701***	-0.022	0.561**
	(0.208)	(0.229)	(0.207)	(0.215)	(0.218)	(0.215)
Real estate loans * Low valuation					0.073	0.321
					(0.155)	(0.249)
Securities, amortized cost	0.148	-0.219	0.210	-0.139	0.197	-0.296
	(0.244)	(0.493)	(0.253)	(0.488)	(0.245)	(0.499)
MBS, amortized cost	0.354	1.048	0.332	1.036	0.303	0.649
	(0.280)	(0.685)	(0.275)	(0.680)	(0.268)	(0.695)
MBS, amortized cost * Low valuation					0.098	1.196*
					(0.363)	(0.662)
Low valuation			0.029	0.028	-0.020	-0.271
			(0.019)	(0.029)	(0.103)	(0.173)
Big	-0.019	0.060	-0.016	0.063	-0.016	0.066*
	(0.027)	(0.041)	(0.026)	(0.040)	(0.026)	(0.039)
HPI	0.017	0.022	0.017	0.021	0.016	0.024
	(0.016)	(0.034)	(0.016)	(0.034)	(0.016)	(0.032)
Constant	-0.101	-0.028	-0.148	-0.069	-0.121	0.068
	(0.132)	(0.296)	(0.145)	(0.297)	(0.144)	(0.305)
N	1098	582	1098	582	1098	582
R^2	0.237	0.434	0.241	0.436	0.242	0.451

Table 10. Share of non-guaranteed mortgage-backed securities that is held-to-maturity in 2001-2007

The dependent variable is the share of mortgage-backed securities that is held-to-maturity. Low valuation is a dummy variable that takes a value of one if the bank has a Tobin's *q* less than one, and zero otherwise. See the Appendix for variable definitions and data sources. Regressions include state fixed effects and quarterly period fixed effects (not reported). Data are based on quarterly observations. Standard errors are corrected for clustering at the bank level. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

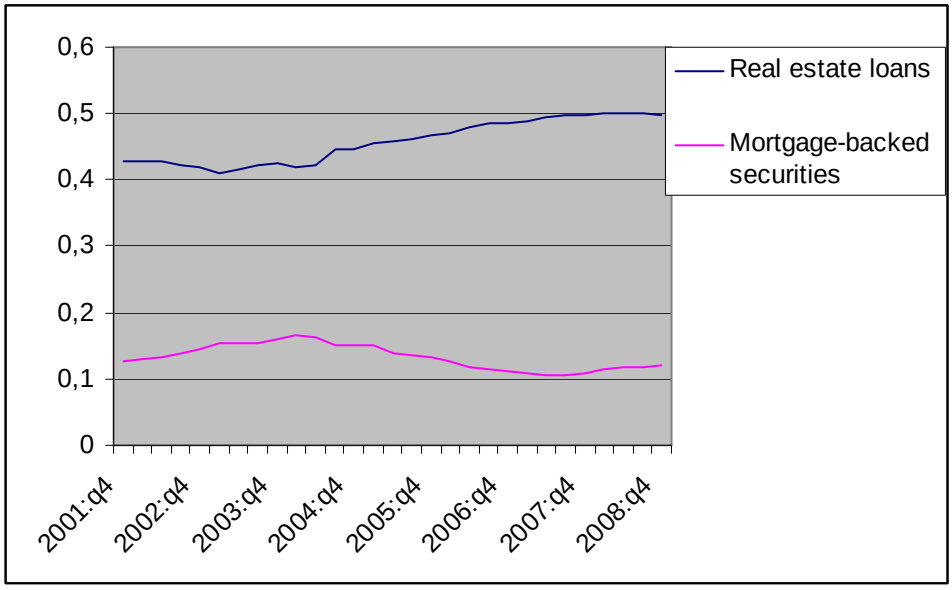
	2001	2002	2003	2004	2005	2006	2007
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Loans	0.116	0.293	0.029	-0.169	-0.641**	-0.564**	-0.619**
	(0.412)	(0.363)	(0.404)	(0.234)	(0.282)	(0.281)	(0.309)
Real estate loans	0.137	0.037	0.138	0.346	0.533**	0.424**	0.475**
	(0.320)	(0.286)	(0.316)	(0.212)	(0.227)	(0.206)	(0.213)
Securities, amortized	1.071**	1.367***	0.781**	0.407	0.354	0.330	0.024
	(0.508)	(0.447)	(0.368)	(0.362)	(0.361)	(0.348)	(0.321)
MBS, amortized	-0.413	-0.801	-0.419	0.068	0.242	-0.090	0.342
	(0.604)	(0.516)	(0.378)	(0.384)	(0.469)	(0.574)	(0.683)
Low valuation	0.011	0.029	0.049	0.049	-0.022	-0.026	-0.015
	(0.076)	(0.042)	(0.035)	(0.033)	(0.037)	(0.029)	(0.035)
Big	-0.065	-0.066	-0.048	-0.018	0.019	0.061	0.049
	(0.090)	(0.063)	(0.054)	(0.048)	(0.047)	(0.046)	(0.043)
HPI	0.114	-0.048	0.043	-0.099*	0.016	0.003	0.005
	(0.095)	(0.142)	(0.115)	(0.058)	(0.048)	(0.074)	(0.026)
Constant	-0.574	-0.281	-0.428	0.460	0.065	0.238	0.047
	(0.380)	(0.376)	(0.304)	(0.364)	(0.179)	(0.216)	(0.243)
N	126	522	516	507	581	572	556
R^2	0.381	0.346	0.270	0.316	0.349	0.274	0.438

Figure 1 . Tobin's *q* and share of zombie banks



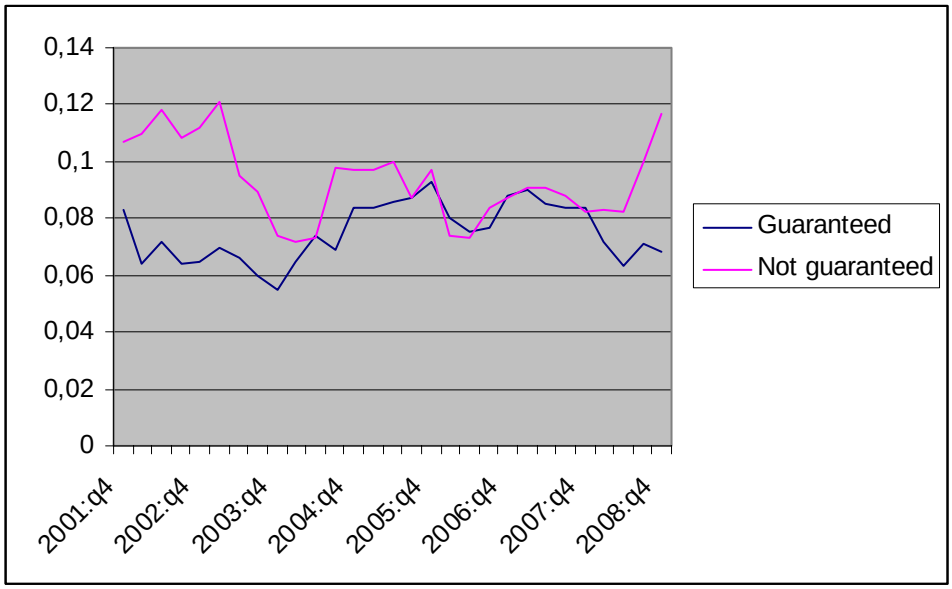
See the appendix for variable definitions and data sources.

Figure 2. Real estate loans and mortgage-backed securities



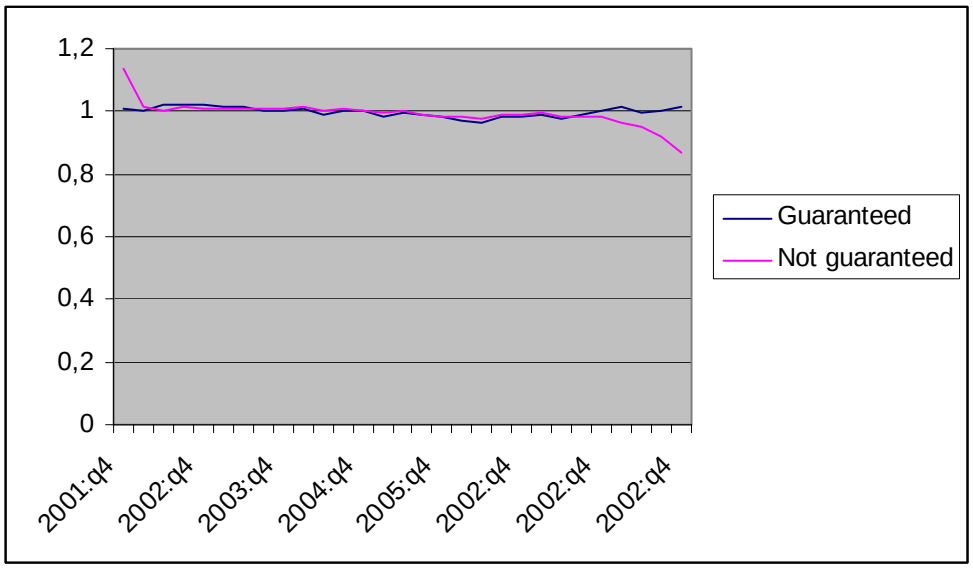
See the appendix for variable definitions and data sources.

Figure 3. Share of mortgage-backed securities that is held-to-maturity



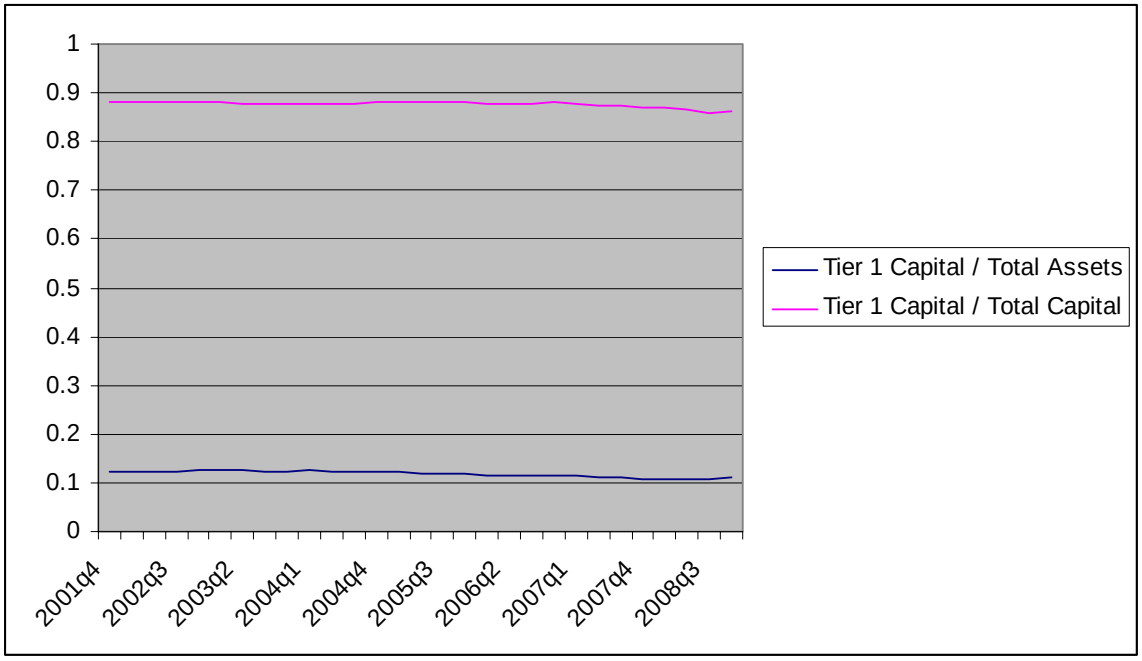
See the appendix for variable definitions and data sources.

Figure 4. Fair value of mortgage-backed securities relative to amortized cost



Variables are computed using data from Call reports..

Figure 5. Tier 1 capital ratio and Share of tier 1 capital in total capital



Variables are computed using data from Call reports. Tier 1 Capital / Total Assets denotes the ratio of Tier 1 Capital to Total Risk-Weighted Assets. Tier 1 Capital / Total Capital denotes the ratio of Tier 1 Capital to Total Regulatory Capital.